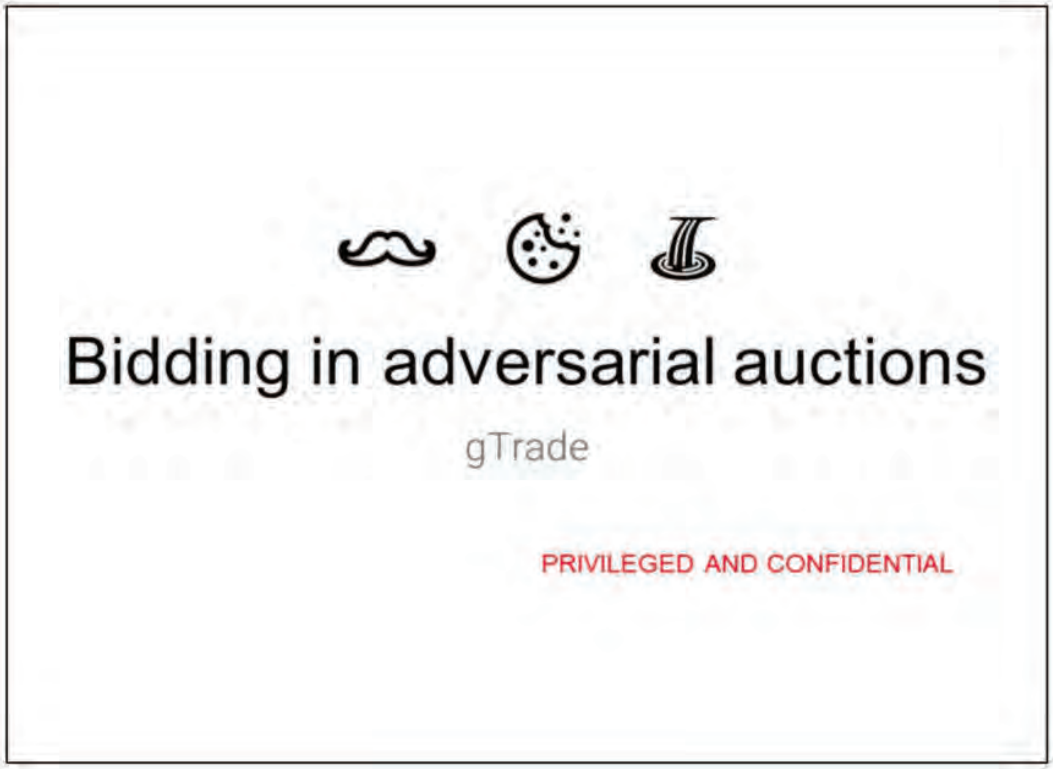
EXHIBIT 40


Bidding in adversarial auctions
gTrade
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Presentation Overview

1. Overview of gTrade
2. Dirty auctions and project Poirot
3. Multiple calls and project Elmo
4. Joint efforts across sell-side/buy-side to clean up the ecosystem
5. Future Roadmap

gTrade Overview

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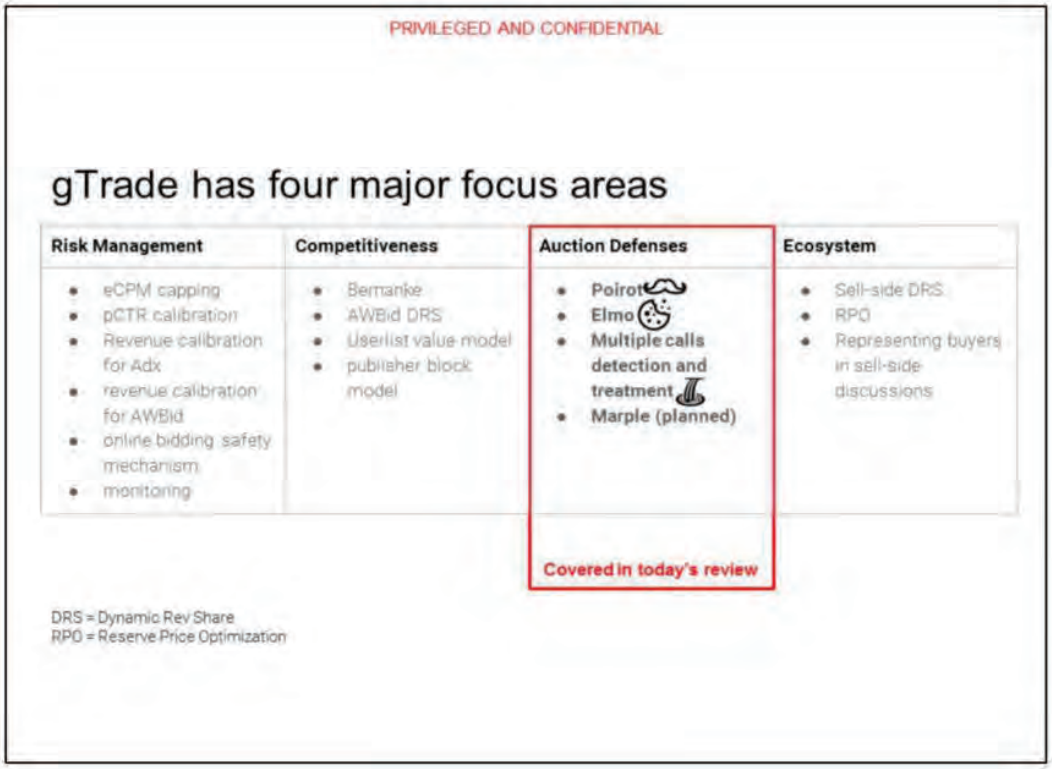
gTrade

- With GDN's exchange spend rapidly growing, gTrade was founded in 2013 to tackle exchange bidding problems
  - Prior to gTrade, there were multiple escalations related to under and over bidding on AdX, and we were not consistently achieving the desired 32% margin
  - There was limited interaction between the buy- and the sell-sides, and less focus on the overall ecosystem
- Now gTrade acts as a doorway for Google's advertisers into exchange auctions to:
  - Manage risk for advertisers and Google
  - Increase competitiveness of our bidding mechanisms
  - Protect advertisers from unfair auctions
  - Ensure overall ecosystem health
- **With Skyray, gTrade optimizes for DBM and GDN, with DBM catching up fast as a result of GDN having a head start.**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gTrade has four major focus areas
Risk Management
eCPM capping
pCTR calibration
Revenue calibration for Adx
revenue calibration for AWBid
online bidding safety mechanism
monitoring
Competitiveness
Bernanke
AWBid DRS
Userlist value model
publisher block model
Auction Defenses
Poirot
Elmo
Multiple calls detection and treatment
Marple (planned)
Ecosystem
Sell-side DRS
RPO
Representing buyers in sell-side discussions
Covered in today's review
DRS = Dynamic Rev Share
RPO = Reserve Price Optimization

gTrade Combined Launch Metrics in this Bucket

AdWords

- +$350M Revenue, +1% CPD
- no major under- or overbidding escalation since 2013 (consistent monitoring)
- 60% of pubs that were using waterfalling in late 2016 are no longer doing so

DBM

- Spend shift from dirty to clean second price auctions
  - -14% spend on 3P Exchanges
  - +9% spend on AdX/AdSense*
- +$252M advertiser surplus that can be spent on clean auction inventory, +7% CPD

*, and other exchanges w/ clean second price auction

Auction Defenses for DBM

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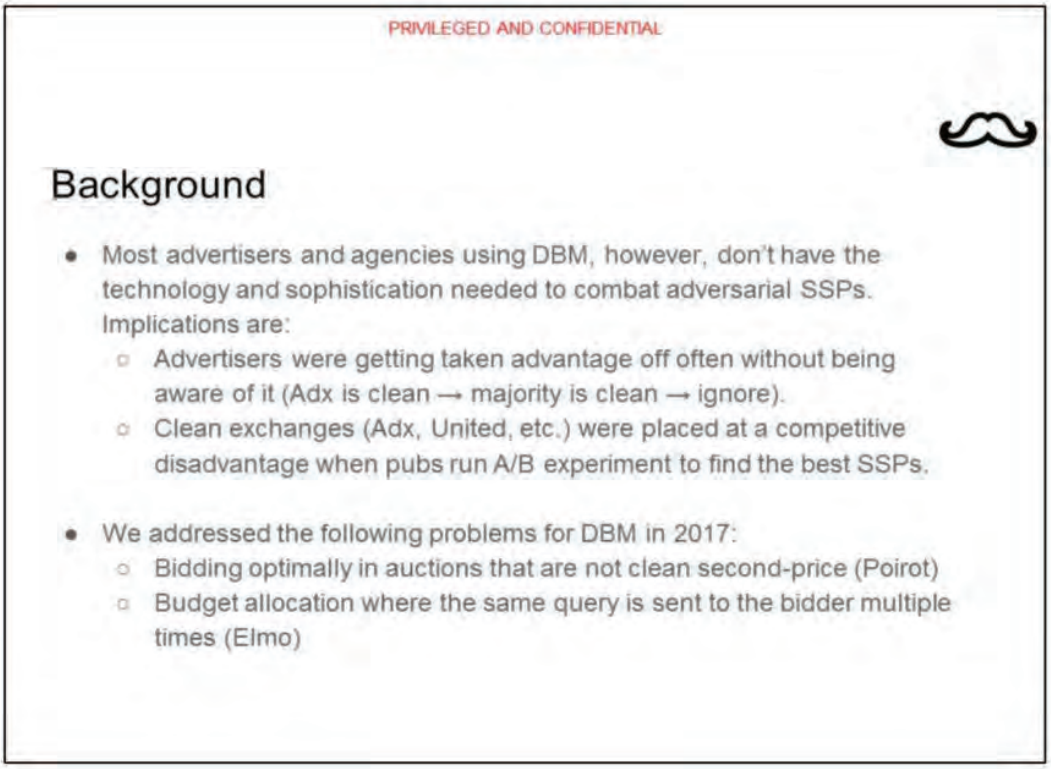
Background

- Adx runs an auction under two principles:
  - Each query is offered for purchase only once
  - Buyers' bids do not affect pricing (aka "clean second price")
- As long as these two hold, the bid optimizer can mainly focus on value prediction (pCTR, pCVR) without investing in "price discovery" exploration and technology.
- DBM buys into many third party markets/exchanges, we know that the above rules are not always respected.
- Before Skyray migration, we effectively trusted the advertisers to account for auction dynamics differences among exchanges and bid accordingly.



May want to mention WPP also agreed that Google is better positioned

Need to explain how Poirot and Elmo complement each other. I.e. Why Poirot is enough if we do not have budget limitation

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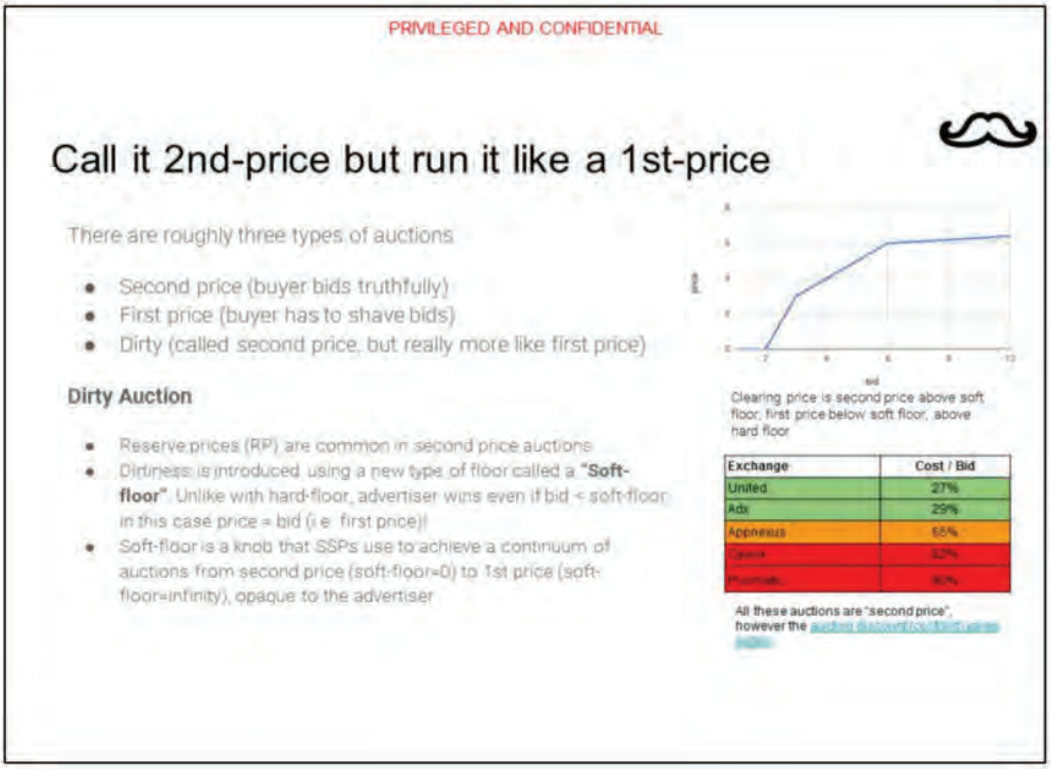
Dirty Auctions and Project Poirot



Roughly three auction types: second, dirty, first; soft floors puts you at opaque point in between second and first price auction

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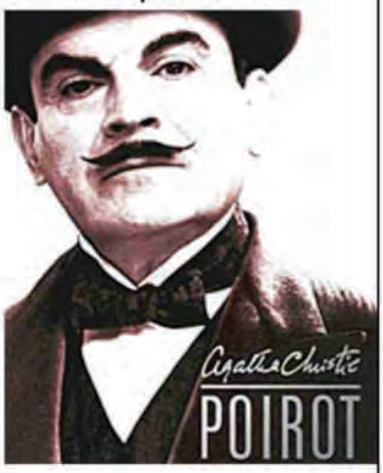
Project Poirot ensures advertiser bids are protected

We invested in building and launching two key components:

1. Algorithmic framework to **detect and quantify** deviations from second price auctions using DBM data
2. Bidding mechanism to **optimize bids** based on the input from framework in 1.

The detailed approach, learnings and outcomes are outlined in the following slides.



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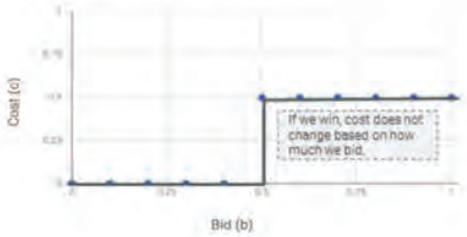
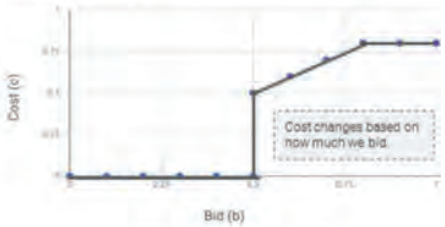
Key insights we leverage for detection: in non-second price auctions, cost changes depending on bid

- In non second-price auctions, we can buy the same impression by bidding less
- Objective: **win the same impressions at lowest price** - savings will buy additional similar impressions

Clean second price auction



Non second price auction



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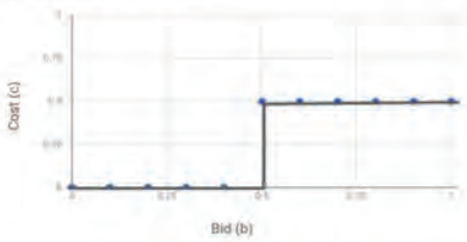
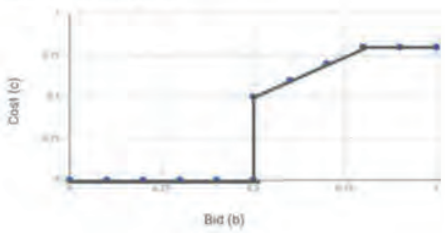
We are defining surplus (money saved by bidding lower and still winning) as optimization goal

- **Assumption:** fixed CPM adv. assign a dollar value ***v*** (CPM in UI) for all impressions
  - They have to pay **c** to derive this value
  - We maximize surplus = **sum(*v* - *c*)** on all winning queries
- Second price auction already optimizes for this in a trivial way

Clean second price auction



Non second price auction



Optimization formulation

We want to adjust bids to maximize surplus:

find bidding policy ***f(v, query features)*** such that we **Maximize** $\sum(v - c)$

- we started out with ***f(v, query features)*** = ***α(***exchange, advertiser***)*** × *v*
- in order to solve this, we need to know how different ***α'***s affect surplus
- hence, we set up exploration experiments using various values of ***α***

We use **Machine Learning** to model the outcome of these experiments and determine the optimal bidding policy (***f***).

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ML model

- We use a hierarchical regression framework (PEAR) where we use query (e.g., exchange) and advertiser features (e.g. advertiser)

- The model predicts f(.) across all these segments but defaults to a prior on small or new segments (e.g., for small advertiser, it defaults to an exchange level model)

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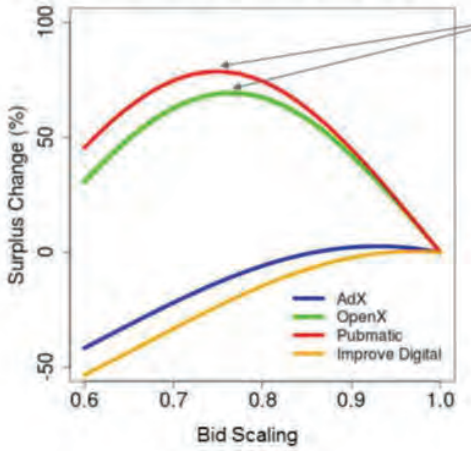
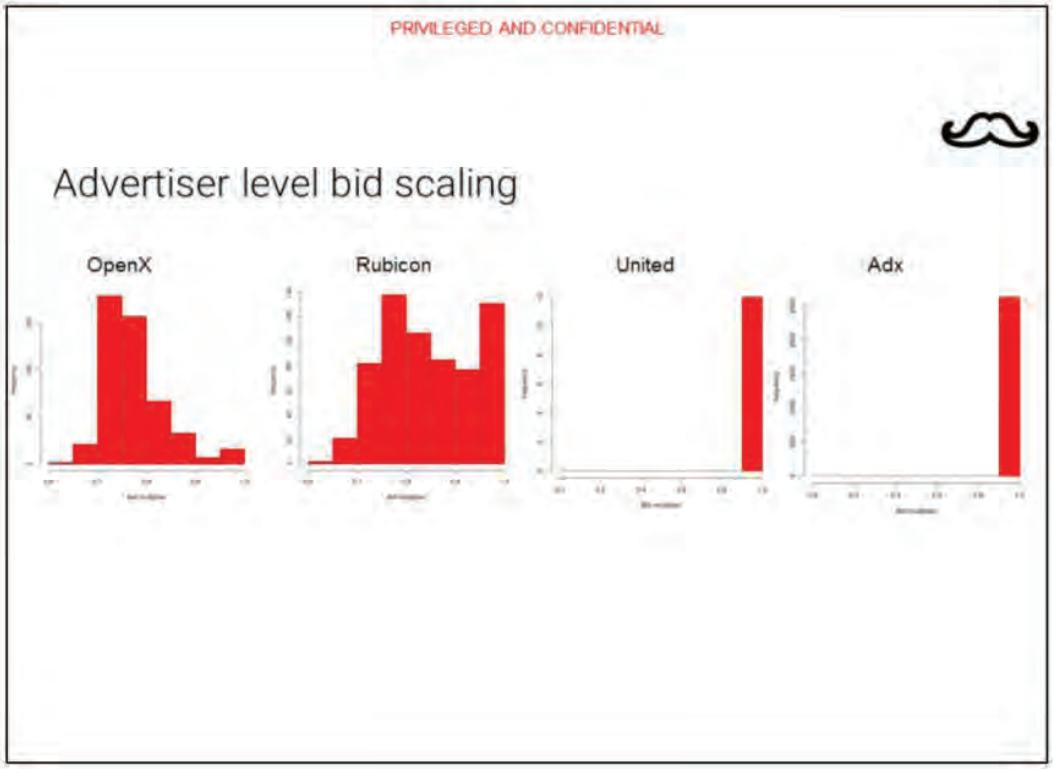
Typical exchange surplus vs bid scaling



Optimal Bid Scaling
by reducing bid, we are saving advertisers money on the queries

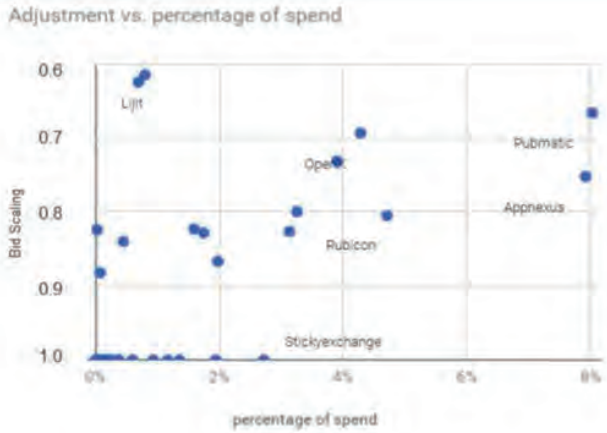
No surplus gain:
Adx, Improve digital

Significant surplus gains:
Pubmatic, OpenX



For exchanges with deviations from second price auctions, there is a spread of advertiser level multipliers, while for clean second price exchanges, 1.0 already is the optimal multiplier, consistently for all advertisers. Exchange-level adjustments are applied to advertisers with insufficient data.

Typical exchange bid scaling on non-Adx exchanges



Google

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Launch impact (RASTA)

- Launched through June, completed in July
- Advertiser impact
  - 7% CPD increase
  - 6% surplus increase ($252M)
- Exchange impact
  - Overall spend neutral
  - Spend and CPM on dirty auction exchanges dropped by ~10%
  - Spend up by 6% on second price auction exchanges
- Very few customers (<1%) opted out

Exchange	Spend change*
Pubmatic	-30.2%
OpenX	-28.5%
Rubicon	-9.9%
United	4.4%
Improve Digital	6.7%
Adx + Adsense	7.0%

* already corrected for budget constraints

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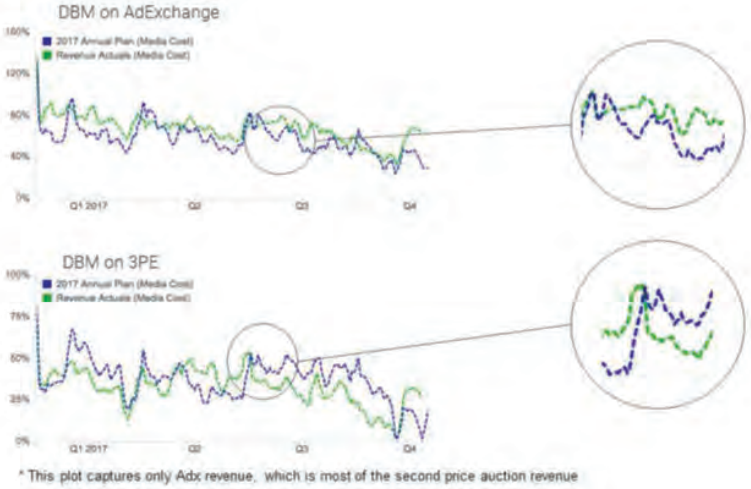
Launch Impact based on 7-day avg. forecast

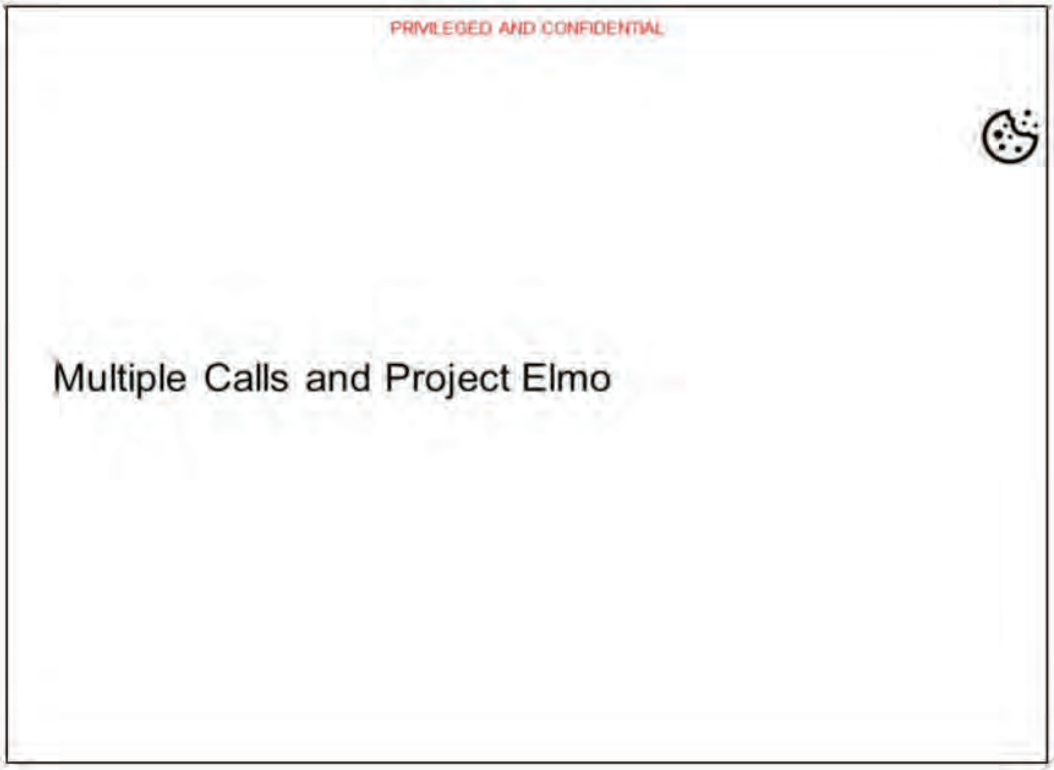


Second price auction* revenue exceeds.

Dirty auction revenue lags.

Full details in [redacted].

* This plot captures only Adx revenue, which is most of the second price auction revenue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Multiple Calls and Project Elmo

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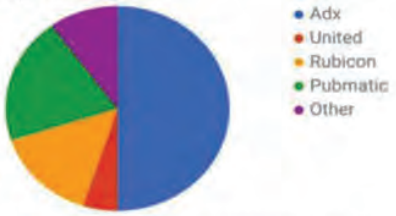
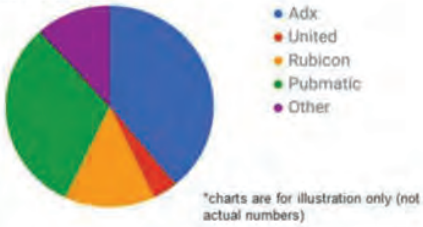
With the Poirot framework, are we done?

True Query Volume



Inflated Query Volume



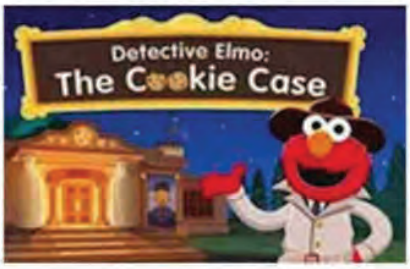
*charts are for illustration only (not actual numbers)

- DBM is over 80% budget constrained
- Every query, a budget constrained ad participates in the auction with some budget throttling probability
- Exchanges send multiple calls for a single query to get multiple shots at budget throttling and land the largest bid
  - Money flows to publishers and exchanges that use repeated calls
  - Even if an exchange (say Adx or United) has the lowest margins, DBM might win through a different exchange (say Pubmatic) simply because the bid was 10x higher!

Project **Elmo** leverages cookie based budget throttling to ensure more consistent bids across calls

We fix the advertisers that can purchase a query from a given cookie during any specific time_bucket (budget throttling based on `cookie × time_bucket`)

We bid the same across multiple calls since they occur close to each other in time



Id	Date	Text
1	10/04/2018 18:32:56	how is cookie available on third-party exchange that can be correlated to biscotti? is it ADID ?

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We see a significant drop in exchanges that exploited this mechanism and gains for the cleaner exchanges

	Revenue
Pubmatic	-24.5%
OpenX	-13.5%
Adaptv	-7.1%
Improve Digital	1.7%
Adx + Adsense	2.9%
United	3.1%

Based on x% experiments, details in RASTA

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Buy and Sell-side collaboration success story

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Disincentivizing multiple calls through Adwords bidding

- Even prior to the previous two launches, we modified Adwords bidding to disincentivize the publishers from using multiple calls
- This involved
  - Detecting multiple calls using an experimental approach
  - Bid capping and turning off Bernanke on publishers using multiple calls
  - **Work with the sell side on proactive comms to publishers (AMs have access to a dashboard of multiple calls pubs)**

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Impact: 60% of subjected publishers are no longer using waterfalls, some examples include eBay Kleinanzeigen and Mobile.de

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SPO and Roadmap

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With our investments in these projects, we build a better Supply Path Optimization and kicked them off long before SPO became a trend in the market

- Competitors are optimizing supply path by turning on/off supply partners to get the best outcome for advertisers
- We use machine learning to devise the best buying mechanism in face of suboptimal supply paths

Roadmap

Q1

First Price Auction Bidding* into Yavin, explicit first price exchanges

Poirot Enhancements continue improving handling non second price auctions and parallel calls

Bidding in app non-second price inventory

Bernanke on App install

Q2

Leverage additional insights for Supply Path Optimization (candidates' inventory quality metrics, ads.txt, ...)

Support DBM direct access strategy (prioritize direct inventory)

Bernanke on Admob

Q3+

Arbitrage-based buying on DBM (pay per click)

Ongoing investments in projects listed in Q1/Q2

* be ready to turn this on for JEDI if needed to compete w/ FB in flat FP auction
Yavin = Demand Product, JEDI = Exchange Bidding

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APPENDIX

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Planned Future Projects

Q1 | Q2 | Q3+

- Non-second price auctions
  - Poirot enhancements
  - Bidding for known first price auctions, JEDI (Exchange Bidding) and Yavin (Demand Product)
  - Solve these problems for Adwords (Project Marple)
- Multiple calls
  - Handling parallel and sequential multiple calls for DBM
- Project Hoover
  - Bidding in the presence of multiple calls and non-second-pricing for app inventory
- Supply path optimization
  - In a header bidding world, can we limit the inventory we buy in?

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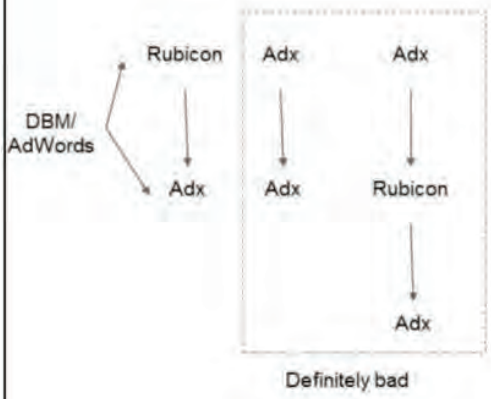
Multiple call mechanisms



Definitely bad

Header bidding/ Exchange bidding

DBM and Adwords buy through multiple channels - have to deal with that reality

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Projects in the pipeline

- Non-second price auctions
  - Project Marple: Improve Adwords bidding on non-second price exchanges
  - Bidding for JEDI and Yavin: Known first price auctions
- Multiple calls
  - Handling parallel and sequential multiple calls for DBM (sometime next year)
  - Project Hoover: Handle bidding with multiple calls on app inventory

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PROPOSED ADDITION

We protect advertisers against the three main ways in which prices are inflated

	Exploit	Defense	Project Name
Non-second Price Auction	Advertisers expecting to be priced based on fair competition in fact are priced based on their bid	Detect deviations from 2nd price, use machine learning to determine best response, apply bid multiplier*	**Poirot** (Optimized fixed CPM Bidding)
Multiple Calls	Multiple parallel calls (Header Bidding) for same impression in order to get highest bid	Fix set of advertisers that can purchase query (cookie x time)	**Elmo** (Cookie-based budget Throttling)
Waterfalls	Sequential calls for same impression (Mediation Chains) to allow setting multiple floors	Reduce bid variance (disable bernanke, cap CPM), work w/ publishers to fix	Waterfall detection and treatment

*: for fixed-CPM bidding, which constitutes 85% of DBM spend and is most exposed

Every minute, we fix the advertisers that can purchase a query from a given cookie (done by budget throttling based on cookie * time_bucket)

Now we bid the same across calls since they occur close to each other in time

Id	Date	Text
1	12/04/2017 07:32:14	If we can somehow make this slide work, we can save having intro slides/transition slides in-between the main topics and just add a final slide on next projects (I added a suggestion also).
1	12/04/2017 07:32:14	I'm not sure we need this slide. I think this is a good summary. but it seems a bit dense and mostly repeats information. Let's see how the deck flows during tomorrow's dry run with Bahman.

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Exchanges derive significant payout increases by deviating from second pricing

Exchange	Cost / Bid
United	27%
Adx	29%
Appnexus	65%
Openx	82%
Pubmatic	90%

Call it 2nd-price but run it as 1st-price

- Reserve prices (RP) are common in second price auctions (set by publishers, same as what we do in Google.com) - Win if the first bid > RP, and pay max(RP, second bid).
- Called RP a "hard-floor" and introduced a new "Soft-floor". Unlike hard-floor advertiser wins even if bid < soft-floor, in this case price = bid (i.e. first price)!
- Soft-floor is a knob that SSPs use to gradually move from a second price (soft-floor=0) to 1st price (soft-floor=infinity).
- There are several other non-second-price auction mechanisms (bid caching, price is k * bid).

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Background

gTrade mission is to
protect advertisers in various auction situations
optimize access to auction inventory

Historically focussed on GDN bidding optimization
With skyray, we can apply these benefits to DBM also

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Discouraging multiple calls to benefit the ecosystem

- Exploiting budget throttling is only one mechanism to drive prices up
- Publisher requests bids over and over for the same query with decreasing floors
- With many calls and many floors, this is essentially a first price auction
- We don't (with exceptions) explicitly allow this in AdX, so publishers find creative ways

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Waterfall detection

- We are running two experiments:
  - E1: bid very high
  - E2: bid very low
- Waterfalled inventory, we expect: #queries in E2 >> #queries in E1
- We validated that this is true, for example ca-pub-7044780476392029 has twice the queries in E2 compared to E1.

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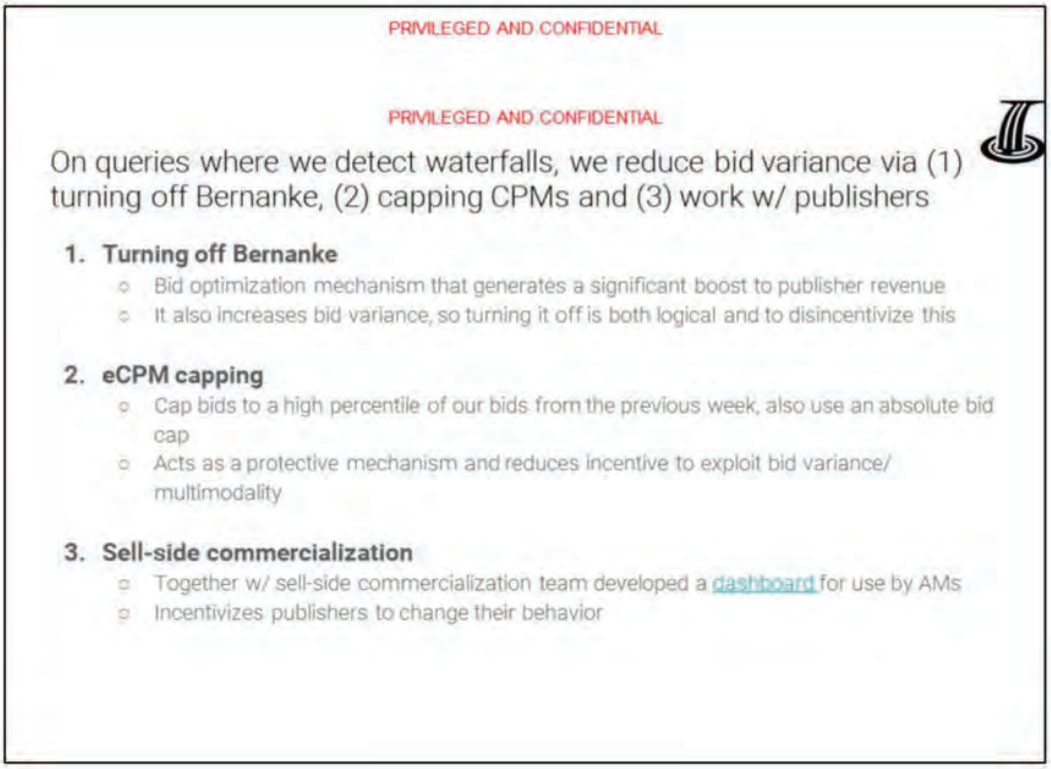
Mediation treatment principle

Publishers are incentivized to call us multiple times because of

- High bid variance
- Multi-model bid distribution (e.g., Remarketing)

Reduce bid variance and push our bid distribution to be more unimodal



Publishers are incentivized to call us multiple times because of
High bid variance
Multi-model bid distribution (e.g., Remarketing)
Reduce bid variance and push our bid distribution to be more unimodal

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Impact of Skyray

- The original mission of the gTrade team was to optimize GDN's performance on ad exchanges and it stayed this way until Skyray
- Post Skyray, we can now also optimize for DBM's performance!
- The projects discussed here (Poirot, Elmo) were made possible thanks to this undertaking.
- While GDN is still ahead in optimizations, DBM is now fast catching up as a result